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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/518,280

12/15/2004

Motoshi Kawamura

F-8507

3579

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EXAMINER

KRAUSE, JUSTIN MITCHELL

ART UNIT

PAPER NUMBER

3682

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,280	<b>Applicant(s)</b> KAWAMURA ET AL.	
	<b>Examiner</b> JUSTIN KRAUSE	<b>Art Unit</b> 3682	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Objections***

Claim 5 objected to because of the following informalities: the phrase "first seal is fixed to the first outer ring counter; and . . . " appears to be an editorial error. It appears as if the intent was to also strike "counter" from the claim. Appropriate correction is required.

Claim 10 and 11 is objected to because of the following informalities: "whereat" appears to be --where at--. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5, 6, 8 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krude (DE 40 23 016 A1) in view of Hughes (US Patent 4,824,264).

Krude discloses a bearing and pinion shaft apparatus comprising:

A shank portion of a pinion shaft (17)

A double row angular contact ball bearing (see fig 2) with vertex of contact angles outside of bearing, the double row contact bearing rotatably supporting the pinion shaft,

Said double row angular contact ball bearing comprising:

an outer ring (9) having inner circumferential surfaces forming first and second raceway surfaces, and first and second outer ring counterbores at first and second outer ring axial ends (shown in figure 2)

a first inner ring (5) having a first outer circumferential surface including a first inner raceway surface pairing with said first outer raceway surface and including a first circumferential depression extending to a first axial end of the first inner ring, the first circumferential depression having a smaller minimum diameter than a minimum diameter of the first inner raceway surface (fig 2)

a second inner ring (6) having a second outer circumferential surface including a second inner raceway surface pairing with said second outer raceway surface and including a second circumferential depression extending to a first axial end of the second inner ring, the second circumferential depression having a smaller minimum diameter than a minimum diameter of the second inner raceway surface (fig 2)

the first and second inner rings being disposed adjacent each other with the first ends being next to each other such that the first and second circumferential depressions form a circumferential recess (fig 2)

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balls (7,8) interposed between the raceway surfaces

the first and second circumferential depressions having side walls

respectively extending to the first and second inner raceway surfaces at positions

radially inward of the balls, such that the balls overhang the circumferential depression

a first seal sealing the first outer ring axial end to a second axial end of

the first inner ring

a second seal sealing the second outer ring axial end to a second axial

end of the second inner ring.

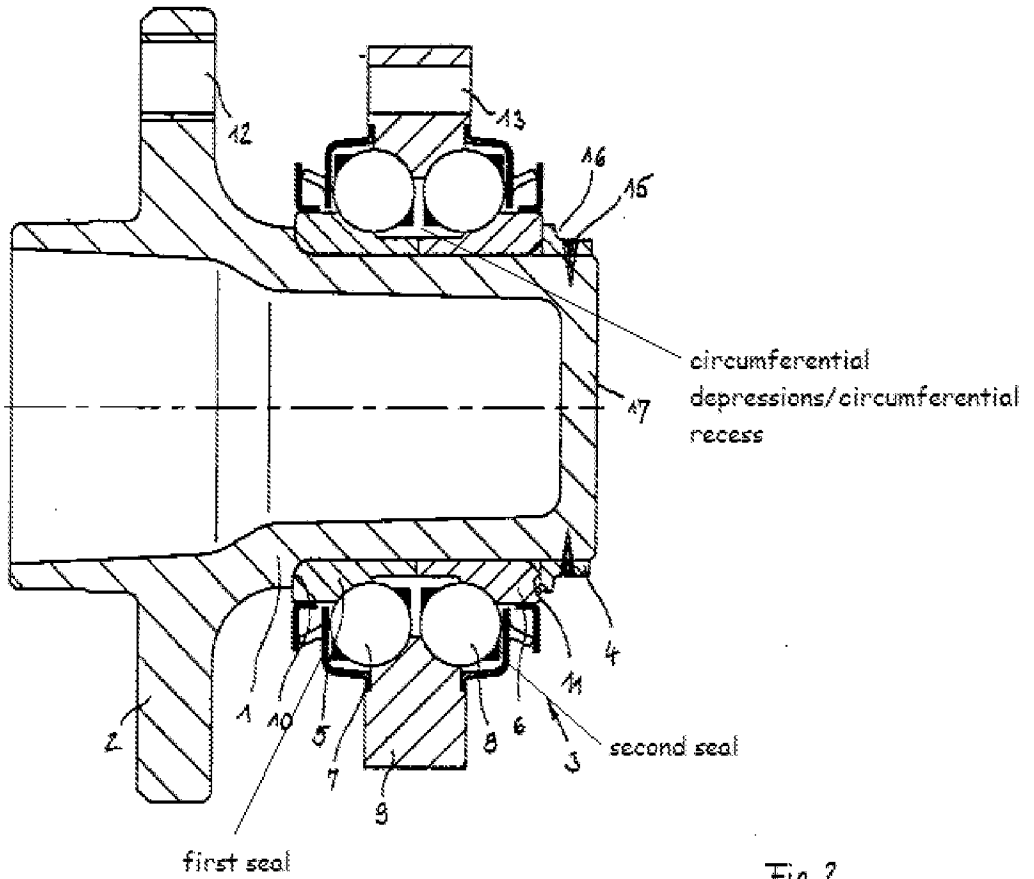


Fig. 2

Krude does not disclose the shank pinion having a pinion gear at one end or grease.

Hughes teaches a shank pinion shaft (136) with a gear (144) at one end for the purpose of transferring torque from the shaft to another gear member (page 2, line 57).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krude to include a pinion gear at one end of the pinion shaft for the desired purpose of transferring torque as taught by Hughes.

Hughes further discloses that the bearings are lubricated, one of ordinary skill in the art would recognize that any lubricating material, including grease may be used for the purpose of lubricating and cooling the bearing during operation and that a lubricant may be selected suitable to the intended use and operating conditions of the device.

Regarding claim 5, an outer peripheral portion of the first seal is fixed to the first outer ring and comprises a lip portion at an inner periphery having a shape for contacting to a shoulder portion of the first inner ring and is able to be opened towards the outside of the bearing ( Krude fig 2).

Regarding claim 6, Hughes teaches the lip portion of a seal pressed into a shoulder portion of the an inner ring by means of a spring ring (34,36) for the purpose of maintaining a seal to prevent debris infiltration and loss of lubricant (col 2, lines 16-17).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krude to include a spring ring to press the lip portion of the first seal into the shoulder portion of the first inner ring for the purpose of preventing debris infiltration and loss of lubricant as taught by Hughes.

Regarding claim 8, Hughes teaches a nut (28) screwed and fixed on a screw shaft portion to secure the ball bearing on the outside of the pinion shaft, and a pinion gear (144) on one end, the screw shaft at the other end (fig 5).

Regarding claim 9, Krude discloses the sidewalls of the circumferential depressions being concave (fig 2).

Regarding claims 10 and 11, the positions where the first and second circumferential depressions join the first and second inner raceway surface are at positions closer to a radial projection of centers of said balls than a radial projection of an outermost periphery of said balls on sides of said first axial ends of said first and second inner rings, said radial projections being orthogonal to an axis of said bearing apparatus (fig 2, the point where the depressions join the raceway is nearly the center of the ball).

Regarding claim 3, Krude does not disclose a specific range of contact angles, however the selection of a contact angle suitable for supporting a desired load is within the level of ordinary capabilities of one skilled in the art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krude to include a contact angle between 30 and 45 degrees for the desired purpose of supporting both axial and thrust loads simultaneously. The results of definition the range are predictable and could be obtained by one skilled in the art through routine experimentation.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krude in view of Hughes as applied to claim 1, further in view of Takata et al (US Patent 6,299,357).

Krude does not provide radii of curvature of the raceways.

Takata teaches an inner raceway with a radius of curvature ranging from 50.5-56% of the diameter of the ball and an outer raceway surface ranging from 51-55% of the diameter of the ball (col 4, lines 37-50) for the purpose of providing a bearing with minimal offset in an axial direction and to provide low inclination when the bearing is under load (Col 2, lines 44-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krude to include radii of curvature within the claimed ranges for the desired purpose of minimizing axial offset and providing a low inclination angle when the bearing is under load as taught by Takata.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krude in view of Hughes as applied to claim 1 above, further in view of Ishiguro et al (US Patent 7,217,036).

Krude in view of Hughes does not disclose an air flow portion in a seal.

Ishiguro teaches an airflow portion (12) in the seal on the side opposite to the operational end (analogous to the pinion end) for the purpose of equalizing pressure inside and outside of the bearing (Col 1 lines 20-30).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krude to include a seal on the counter-pinion gear side for the desired purpose of equalizing the pressure inside and outside of the inner bearing cavity as taught by Ishiguro.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-11 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUSTIN KRAUSE whose telephone number is (571)272-3012. The examiner can normally be reached on Monday - Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on 571-272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. K./  
Examiner, Art Unit 3682

/Richard WL Ridley/

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